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ABSTRACT

This brief paper discusses four of the computer applications explored at Wayne State University over the past decade to provide alternative solutions to problems commonly encountered in teacher education and in providing support for the classroom teacher. These studies examined only databases that are available in the public domain; obtained original documentation where possible for each database considered; and avoided elaborate analyses of data in favor of descriptive statistics. Successes realized and problems encountered are discussed for each of the four databases described: (1) a student data file from the registration data collected by the university for all students in the College of Education, which provided the foundation for the college's response to an accreditation review of all university programs in 1986; (2) the Michigan Professional Personnel Register, an annual census of the state's public school teachers, administrators, and other professionals, which has been used in studies of the college and its graduates; (3) the Educational Resources Information Center (ERIC), which has been mounted on a mainframe computer and made available to students at the university; and (4) the development of a local area network which is to be integrated into the teaching, research, and service functions of the college. Diagrams of the major components of the College of Education's computer-based information systems and the components of the local area network are provided as well as 27 references. (RP)

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TITLE: COMPUTER-BASED INFORMATION SYSTEM CULTIVATED TO SUPPORT A COLLEGE OF EDUCATION

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

For more than a decade, we have explored ways of utilizing the information processing power of the computer to provide alternative solutions to problems commonly encountered in teacher education and in supporting the classroom teacher. This brief paper indicates some of the areas where we have been moderately successful as well as those problem areas where we have floundered.

As a first precept, we have used only those data bases which are in the public domain. Even public domain data must be used with discretion to avoid intruding into an individual's personal affairs. Within that group, we would count data bases such as: the Michigan Professional Personnel Register, the Michigan Teacher Certification Record, and the Michigan Educational Assessment Program. In any case, we have eschewed collecting any priviledged or confidential information.

Second, we have attempted to gather the original documents used in collecting information for a given data base. Since the data collection documents as well as the data collection procedures may be changed, it's important to have copies of these documents. For example, the data collected in the MEAP data base was initiated in 1970 and the data format changed each year for almost a decade. That may be an excellent example of refining a measuring instrument, but it's a nightmare for a researcher seeking to observe patterns and consistent trends from one year to the next.

Third, we avoided using elaborate statistical analyses of data. We are persuaded that the bulk of measures in education are nominal level of measurement (counting) or ordinal level of measurement at best. Therefore, descriptive statistics are generally adequate for our purposes. As circumstances may require, we use nonparametric

statistics to draw inferences about populations. With this much prologue, let us consider the following data base.

Student Registration Data:

At the end of each term, we have obtained a computer tape copy of the registration data collected by the University for all College of Education students. Some of these data included: ID number, name, street address, zip code, rank, academic major, course designators, grades, HPA. More than 50 separate fields of information are collected each term for each student.

We started assembling these data in the Fall 1970, primarily to find out where our students lived in the cities and towns of southeastern Michigan(1). Futhermore, we didn't know how long an undergraduate or graduate student would continue in a program in the College before he or she dropped out of school.

In the Fall 1970, we collected a computer tape of the registration records of about 4000 graduate students and another 4000 undergraduate students who were enrolled in the College's programs that term. In the Fall 1986, we collected data for about 2390 graduate students and 620 undergraduate students.

Successes:

We discovered in 1971 that our undergraduate and graduate enrollment was primarily from Detroit 44% and Wayne County 15% while 21% lived in Oakland County and 15% lived in Macomb County(19). When the accreditation teams arrived in 1984 (National Association for

Accreditation of Teacher Education - NCATE) and again in 1986 (North Central Association), those enrollment percentages were within 1% of those determined in 1971.

One of the questions raised by the accreditation teams was directed at a comparison of the academic achievement of the College of Education students with respect to the academic achievement of their classmates in liberal arts, engineering, and other University departments. Since we had the ID numbers of our students, we could select education students from the ACT and SAT achievement data file. We also selected random samples of other students from the ACT and SAT data files. We found that there was no significant difference in the median ACT scores of College of Education students when compared with median ACT scores of random samples of other WSU students. The same condition was found when SAT scores were compared for groups of education and non-education students.

In another area, there has been a great deal of anguish about the loss of minority students from the University. Although Wayne State has a substantial enrollment of Blacks and other minority students (28%), a recent study by Lichtman and others (27) indicated that as many as 58% of Black freshmen students would dropout of the University within five years after admisssion, 35% of the Black freshmen would graduate or continue at WSU, and the future of the remaining 7% Black freshmen was unknown.

At Wayne State, the great majority of the undergraduate education students do not enter the College of Education until their junior year. Using the College data base, we were able to establish that 75% of the College's undergraduate students would graduate within six years. For masters level and doctoral level students, the

corresponding figures are 67% and 53% graduate within six years.

After graduation, our students enter employment or seek promotion to leadership positions in elementary , secondary, and post-secondary schools. Information about this effort is obtained from the Michigan Professional Personnel Register (13).

Another benefit of this system is the speed and accuracy of collecting information about students and graduates when it's time for accreditation review of professional programs. In June 1984 the National Council for Accreditation of Teacher Education (NCATE) accredited all programs of the WSU College of Education intended to provide professional education for teachers, administrators, and other professional school personnel (19). This produced a spin-off data base of more than 60 data files which describe the College's programs using NCATE's standards for accreditation. Moreover, it provided the foundation for our response to the scheduled accreditation review of all University programs by the North Central Association in April 1986.

Problems and/or Failures:

The relative ease of collecting and analyzing these data suggested to some of us that we should build a student plan of work for undergraduate as well as graduate students. We thought that students could indicate which courses they wanted to select for several terms in advance. It seemed that we could use that advance information to select instructors and plan course offerings to make it possible for students to get courses when and where they wanted them.

We developed forms to implement the process and collected a great deal of data from many students. However, the model presented little

resemblance to the real world in which our urban student body must thrive. A great many students could not accurately forecast one course they would take the following term, let alone estimate with precision their enrollment in classes to be held in one or two years. This writer could recite a litany of sad stories which we brought upon ourselves.

Michigan Professional Personnel Register:

The Michigan Professional Personnel Register is the annual census of Michigan Public Schools' teachers, administrators, and other professionals. It includes information about their teaching assignment, degree, academic majors, teaching experience, race, sex, and other personnel data.

We started collecting copies of the Register in 1970 in order to determine where graduates of the WSU College of Education were employed. There were many strong opinions expressed, but the analysis of data in the Register enabled us to calculate precise answers. Our annual collection of the data in the Register established a longitudinal data base which provided the raw material for many studies of our College and its graduates (2,3,4,5).

For each of the past 15 years, the Register has contained one line of data for 90,000 to 110,000 professionals. This amounts to a cumulative data base of more than 45 million pieces of information, e.g.,

(100,000 records) (30 fields/record) (15 years) = 45 million.

Successes:

Analyses of this data base using Set Theoretic Data Structure (STDS) and original FORTRAN programs enabled us to establish that 95% of our graduates employed in Michigan Public Schools were employed in public schools of Wayne, Oakland, and Macomb Counties. (1)

We were able to identify the patterns of public school employment of graduates of other Michigan universities in what appeared to be spheres of influence (2). Graduates of the WSU College of Education scarcely ever entered employment of school districts outside the tri-county area. This defined our urban student body and a mission to support the professional development of teachers and administrators who were grappling with the problems of providing suitable instruction for the children and youth of Metropolitan Detroit.

The availability of longitudinal data made it possible to identify changes which were ordinarily hidden. Using the social security numbers, teaching assignment codes, and school district codes we were able to establish the 17% to 20% personnel changes which occured each year in the public schools of Wayne, Oakland and Macomb Counties (18). Changes in employment of ethnic minorities as teachers and administrators could be established (10). Availability of salary data made it possible to compare salaries of male and female administrators with equivalent professional education and experience (6). Indeed, a letter from Michigan School Board President Mary Jean Kelly in 1976 indicated that this information had been helpful in shaping a policy statement on sex discrimination in employment in Michigan Public Schools:

"I want you to know that I much appreciated your sending your study on comparative salaries of male and female administrators in Michigan Public Schools. I have made extensive use of it, especially in urging adoption by the State Board of Education of the Guidelines for the Elimination of Sexism."(21,22)

Other studies have traced the time which beginning teachers will remain unemployed as teachers before moving out of the available teacher supply and into alternative career paths (12). This tends to dampen the optimistic view of some that a large supply of qualified teachers has accumulated and waits eagerly to be employed by public schools. At least one study suggests that teaching competence and professional qualifications often have little to do with employment of substitute teachers for daily or protracted employment (14).

Problems and/or Failures:

Removal of the salary data from the Register eliminated the opportunity to do comprehensive studies which would use the public record to identify salary discrimination due to race, sex, or age. In other words, we could not repeat the study (6) which documented salary discrimination between male and female administrators of equivalent education and experience. We could not repeat today the 1978 study (10) comparing salaries of ethnic minority and caucasian administrators. A discussion of the reasons for removing this important piece of information from the public record could be long and heated.

Education Resources Information Center (ERIC):

The ERIC collection of research reports provides a valuable treasury of information about problems, solutions, and learning opportunities at all levels of education. Abstracts of more than 250,000 reports and conference proceedings are presented in this collection through the monthly periodical, Research in Education (RIE).

Another 250,000 abstracts and references to journal literature are available in the Current Index to Journals in Education (CIJE) part of the ERIC data base.

About 1970 we obtained computer tape copies of all abstracts in RIE and CIJE. The data base was less than 5 years old at that time, and our efforts to interpret the computer tape format were correspondingly awkward.

In our first program, we were barely able to conduct a search of the latest 20,000 documents in the RIE collection. At that time there were only 80,000 documents in the entire collection, so we had to make four passes over the data base to search the entire file.

The cost for machine time on Wayne State's IBM 360 system was about $40 per sub-file -- which amounted to about $160 per question which went through the entire data base. Fortunately, our research project received a 90% discount on computing charges. That meant that a query of all 80,000 documents in the ERIC file was ($160) x (10%) or $16 hard cash cost for each question.

During the next decade, we improved the speed of the search program, conducted batch searches of 15 to 20 questions. We developed a simple, on-line interview program so that faculty and students could enter their name and 1 to 3 descriptors;, then, choose from six

Boolean expressions to indicate the way they wanted the descriptors to be combined in their individual search question.

Now, faculty arrange for graduate students in their classes to enter search questions on-line or through a simple search request form. In the Spring 1986 we started orientation seminars for undergraduate and graduate students, so that they may submit on-line ERIC search requests from public terminals on campus or from remote terminals/microcomputers at home.

Computer searches of the ERIC data base now provide access to more than 250,000 RIE abstracts and more than 250,000 CIJE abstracts of journal articles. A typical question costs about $4.00 computing time using the University's Amdahl 470/v8 and Xerox 9700 printer. With an 80% subsidy of computing costs, the typical question costs ($4.00) x (20%) or $.80 to search a data base of more than 1/2 million documents.

Successes:

During the past decade we have kept pace with the growth of the ERIC facility in providing machine searches of the professional literature covering a large number of topics and problems faced by teachers and administrators in our urban schools. We normally conduct 1500 searches each year and we do not charge any student or faculty member for the cost of the search. This contrasts with the 30 to 40 searches of the ERIC data base conducted by the University Library staff using the commercial service with a charge of $5 to $10 per question. While the total number of documents in the data base have increased tenfold from our early searches, we have reduced the cost of a single comprehensive search by 75%.

We have simplified access to the ERIC search system so that faculty, undergraduates, and graduate students may submit queries directly from public computer terminals on campus or from their respective homes using a computer terminal and modem.

Problems and/or Failures:

We don't have solid information to indicate the extent to which the information provided in the ERIC abstracts or microfiche are actually helpful to teachers and administrators in solving professional problems. We have reason to believe that ERIC citations are useful to students in organizing and writing papers for college classes. However, we don't know the extent to which this information resource saves time for students and faculty in gathering background information or in actually solving professional problems.

Persons who frequently use the ERIC search procedure have been frustrated at times in selecting the correct descriptors to identify articles or reports on their specific topic. The procedure limits the user to a maximum of 3 descriptors per question. The combination of these descriptors into one of the six alternative Boolean search expressions may not be understood by some users, and they may receive a set of abstracts which satisfy the Boolean expression but frustrate the person seeking information. We are using periodic seminars to assist students and faculty in overcoming this breakdown in communication.

We believe that security of our data files and search procedure is now sufficiently tested that we can offer this ERIC search resource to our entire student body. However, experience has cautioned us to

avoid challenging hackers with boasting.

Local Area Network Introduced Into System:

A grant from UNISYS (formerly Burroughs Corporation) enabled us to develop a local area network (LAN) using their XE-520 processor linked to five B-25 microcomputers and peripheral devices. As shown in Figure 2, the cluster provided access to FORTRAN, PASCAL, Assembler, MULTIPLAN, MS-DOS, and other software packages. The OFISfile held 160 megabytes of disk storage with a search and retrieval system in firmware.

Successes:

This section should be entitled "Opportunities for Success" rather than "Successes", but labeling consistency prevailed in this paper. This award provided to us the opportunity to explore use of the videodisc player under control of the B-25 microcomputer. We started with a commercial authoring system to develop instructional modules with the videodisc , but we were forced to develop an original authoring protocal when the commercial version failed to live up to its advertising.

A graduate student in art education developed an instructional vignette about the works of Vincent Van Gogh using the homebrew authoring system. Little by little we've added new features to the system so that it can be used with faculty or students.

The OFISfile collects "static" data such as correspondence, reports, memos, and similar documents which are updated by adding

another related document rather than altering the original. OFISfile has an internal search and retrieval system intended to provide flexibility in entering and classifying documents. Information in the OFISfile may also be accessed by users with a microcomputer or dumb terminal and modem used from a remote local.

Using modems within the cluster, we have linked the LAN to the WSU mainframe as well as to the MERIT Network and to one or more computing resources in a school district.

Problems and/or Failures:

Continued grant support from a private source is as precarious as a State or Federal grant. It is essential to integrate the new hardware and software into the teaching, research, and service functions of the College as soon as possible. Ideally, the new system should provide a resource which was needed by all users and previously unavailable.

We are using the OFISfile to support graduate students in identifying and finding literature related to their own research interests and tasks, e.g. doctoral dissertations, masters projects, computer software.

The EX-520 is being used to enable undergraduate and graduate students to develop computer assisted instruction modules using the interactive videodisc capability of the system. It is also being honed to provide monitoring of student's performance in the College's Achievement Center, where elementary and secondary school pupils receive tutoring support.

Figure 1 Major Components in WSU College of Education Computer-Based Information System

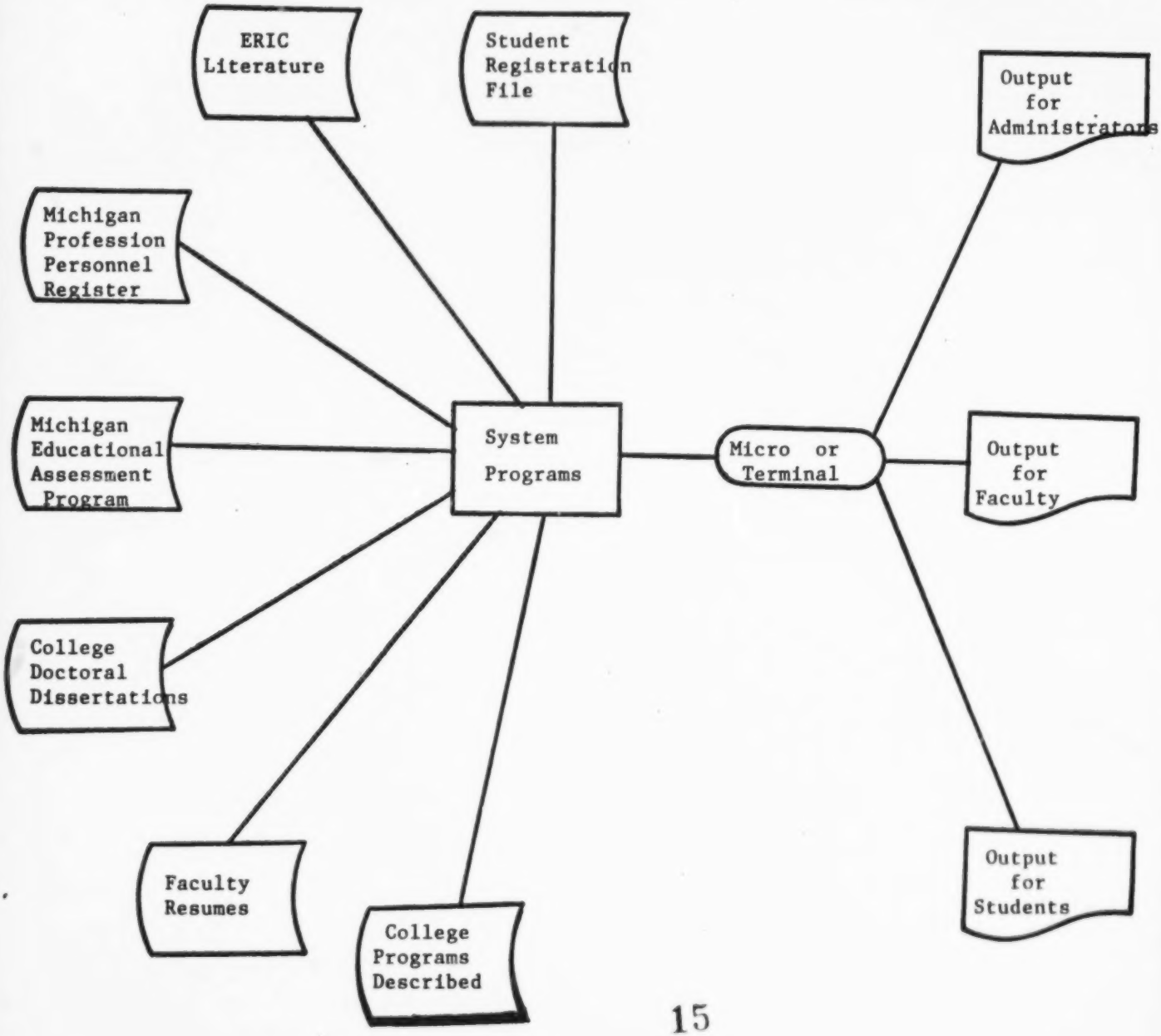
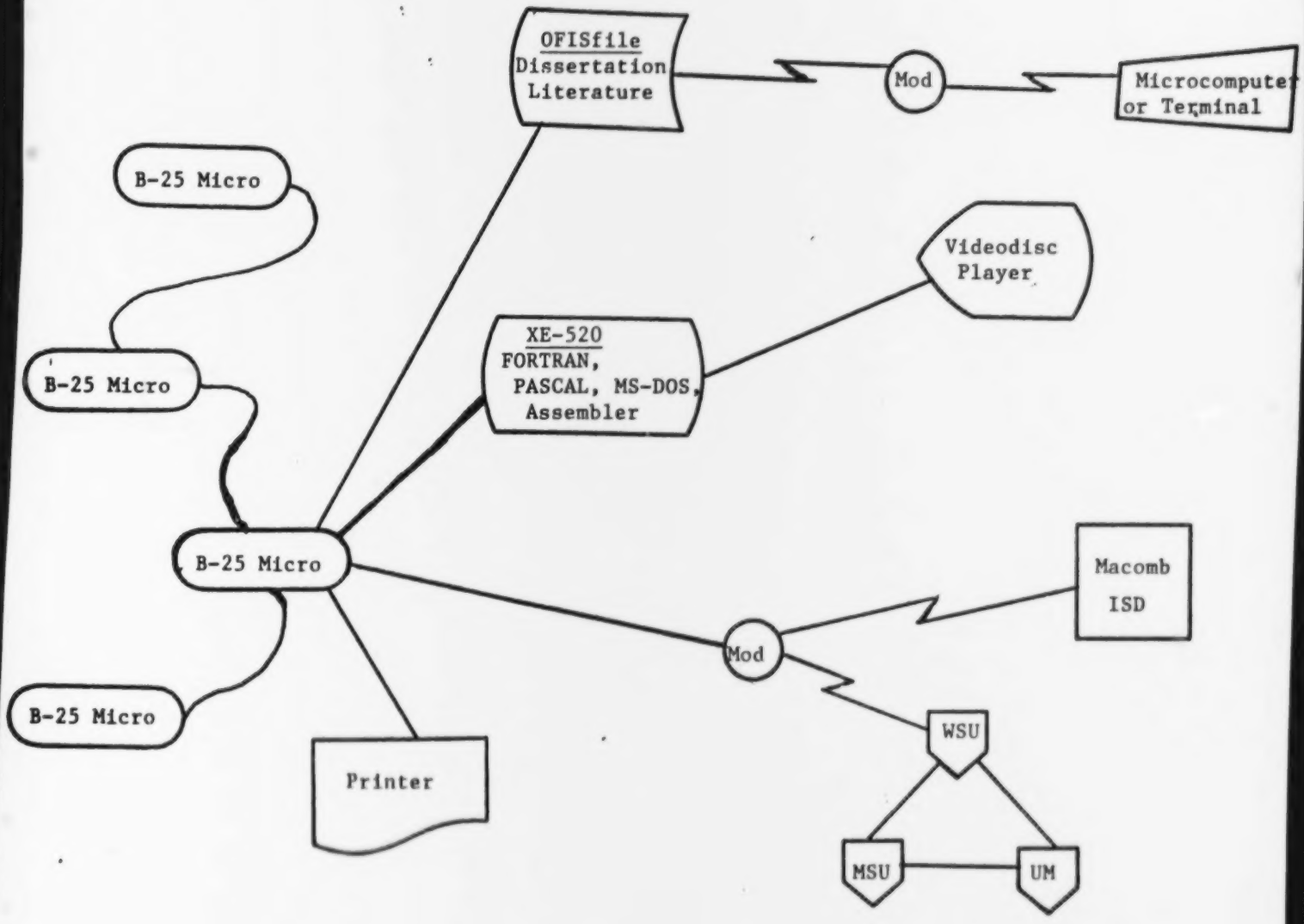


Figure 2 UNISYS Components in Local Area Network



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